



## Complete Summary

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### GUIDELINE TITLE

Acute management of autonomic dysreflexia: individuals with spinal cord injury presenting to health-care facilities.

### BIBLIOGRAPHIC SOURCE(S)

Paralyzed Veterans of America/Consortium for Spinal Cord Medicine. Acute management of autonomic dysreflexia: individuals with spinal cord injury presenting to health-care facilities. Washington (DC): Paralyzed Veterans of America (PVA); 2001 Jul. 29 p. [138 references]

## COMPLETE SUMMARY CONTENT

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## SCOPE

### DISEASE/CONDITION(S)

Autonomic dysreflexia (AD) following spinal cord injury

### GUIDELINE CATEGORY

Evaluation  
Management  
Treatment

### CLINICAL SPECIALTY

Emergency Medicine  
Family Practice  
Internal Medicine  
Neurology  
Obstetrics and Gynecology

Pediatrics  
Physical Medicine and Rehabilitation  
Urology

#### INTENDED USERS

Advanced Practice Nurses  
Health Care Providers  
Nurses  
Physical Therapists  
Physician Assistants  
Physicians

#### GUIDELINE OBJECTIVE(S)

To make available information that can be used by health-care providers when an individual with signs and symptoms of autonomic dysreflexia presents to their facility

#### TARGET POPULATION

Individuals with spinal cord injury (SCI) at or above the level of the sixth thoracic vertebra (T6)

#### INTERVENTIONS AND PRACTICES CONSIDERED

1. Assessment of signs and symptoms of autonomic dysreflexia via physical examination
2. Blood pressure and pulse measurement
3. Investigation of systemic causes of autonomic dysreflexia
4. Assessment of pregnant women and referral to obstetric health-care provider, if required
5. Urinary catheterization using lidocaine jelly as local anesthetic
6. Nonpharmacologic management of elevated blood pressure through lateral tilt or upright positioning and loosening clothing or constrictive devices
7. Pharmacologic management for elevated blood pressure ( $\geq 150$  mmHg systolic) with medications such as nifedipine (immediate-release form), nitrates (sodium nitroprusside, isosorbide dinitrate, or nitroglycerin ointment), hydralazine, mecamylamine, diazoxide, phenoxybenzamine, captopril, prazosin
8. Management of symptomatic hypotension (leg elevation, intravenous fluids, adrenergic agonists such as norepinephrine)
9. Assessment of fecal impaction by rectal exam and manual evacuation, if impaction present, using local anesthetic agent such as lidocaine jelly
10. Hospital admission, if required
11. Documentation of autonomic dysreflexia episode
12. Patient and caregiver education about autonomic dysreflexia, including written guide or alerts, and review of treatment plan
13. Scheduling of detailed medical evaluations

#### MAJOR OUTCOMES CONSIDERED

- Blood pressure elevation or reduction
- Pulse rate
- Exacerbation of autonomic dysreflexia

## METHODOLOGY

### METHODS USED TO COLLECT/SELECT EVIDENCE

#### Searches of Electronic Databases

### DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The overall strategy for finding evidence relevant to the management of autonomic dysreflexia in individuals with spinal cord injury paralleled that used in earlier guidelines and is modeled after the methods recommended by the Agency for Health Care Policy and Research\* (1993) and the Institute of Medicine (1990). Three separate search strategies were developed to find literature addressing each of the three foci of the guidelines revision. These literature searches provide a general update of the literature on autonomic dysreflexia since the original guidelines were published and comprehensive reviews of the literatures on the management of autonomic dysreflexia during pregnancy and delivery and on the use of sildenafil by men with spinal cord injury.

A search of the MEDLINE database from January 1996 to June 1999 was conducted to identify articles published since the original guidelines. To identify issues related to autonomic dysreflexia during pregnancy and delivery in women with spinal cord injury, a topic not covered in the original guidelines, searches were conducted for the period 1966 through June 1999. To address the use of sildenafil in men with spinal cord injury, searches were conducted from June 1996 (the time at which the first article appeared on its use for erectile dysfunction in general) through June 1999.

Because no Index Medicus subject headings (MeSH) existed until recently for autonomic dysreflexia, text word searches were conducted using the following key words: autonomic dysreflexia, autonomic hyperreflexia, paroxysmal hypertension, paroxysmal neurogenic hypertension, autonomic spasticity, sympathetic hyperreflex, mass reflex, neurovegetative syndrome, and vegetative dysregulation. To identify autonomic dysreflexia occurring during pregnancy and labor in women or associated with the use of sildenafil by men, the text word searches were combined with the Medicus subject headings subheadings pregnancy, eclampsia/preeclampsia, sildenafil, erectile dysfunction, and impotence.

As was the case in the original guidelines, inclusion and exclusion criteria were established for the literature searches. Articles involving nontraumatic paralysis were excluded, as were articles that focused on pediatric patients or that considered differential diagnoses without mention of autonomic dysreflexia. Case series and small cohort studies were included because the literature is relatively lacking in nonobservational studies. Animal studies were included because of the uncertainty of the disease pathophysiology. Unlike the original guidelines, only articles published in English were included.

More than 366 abstracts from the literature searches were reviewed, using the inclusion and exclusion criteria, to determine relevance to management of autonomic dysreflexia in general, during pregnancy and delivery for women, and following use of sildenafil by men. Those abstracts that met the criteria were retrieved. If an article did not have an abstract or if its relevance was unclear, the article was retrieved for further evaluation. Additionally, the reference lists of all relevant articles were reviewed to identify additional or "fugitive" articles.

The data extraction forms developed for the original guidelines were enhanced to further standardize the data used for extraction. These extraction forms were used to evaluate the 32 articles that met the stated inclusion/exclusion criteria.

Following preliminary discussions by the expert panel, it was decided to expand the guideline to include the pediatric population and pregnancy as well as update the overall search on autonomic dysreflexia to extend from January 1966 to May 2000. For the pediatric search, 41 articles were identified and all were excluded (i.e., were either not relevant or had been identified in the nonpediatric searches). For the extended search, 64 articles were identified, of which 19 were retained and summarized in evidence tables.

\*Agency for Health Care Policy and Research (AHCPR) is now known as the Agency for Healthcare Research and Quality (AHRQ).

#### NUMBER OF SOURCE DOCUMENTS

More than 366 abstracts were reviewed; 32 articles met the inclusion/exclusion criteria

#### METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

#### RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Hierarchy of the Levels of Scientific Evidence:

- I. Large randomized trials with clear-cut results
- II. Small randomized trials with uncertain results
- III. Nonrandomized trials with concurrent or contemporaneous controls
- IV. Nonrandomized trials with historical controls
- V. Case series with no control

#### METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

#### DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Extracted information was compiled into evidence tables according to topic area and disseminated to panel members for use in writing the revised guideline

recommendations. The methodologists began by employing the hierarchy of scientific evidence discussed by Sackett (Sackett, D.L. Rules of evidence and clinical recommendations on the use of antithrombotic agents. *Chest* 1989; 95[2 Suppl]: 2S–4S) and enhanced by Cook et al. (Cook, D.J., G.H. Guyatt, A. Laupacis, et al. Rules of evidence and clinical recommendations on the use of thrombotic agents. Antithrombotic Therapy Consensus Conference. *Chest* 1992; 102[Suppl 4]: 305S–11S) and the U.S. Preventive Health Services Task Force (U.S. Preventive Health Services Task Force. *Guide to Clinical Preventive Services*, 2nd edition. Baltimore: Williams and Wilkins, 1996). Additionally, each study was evaluated for internal and external validity. Factors affecting internal validity (i.e., the extent to which the study provided valid information about the individuals and conditions studied) included sample size and statistical power; selection bias and inclusion criteria; selection of control groups, if any; randomization methods and comparability of groups; definition of interventions and/or exposures; definition of outcome measures; attrition rates; confounding variables; data collection methods and observation bias; and methods of statistical analysis. External validity--the extent to which the study findings were generalizable to conditions other than the setting of the study--was evaluated through an examination of the characteristics of the study population, the clinical setting and environment, and the investigators and providers of care. The resulting rankings were provided to the panel members during the deliberation process.

Each guideline recommendation was classified, depending upon the level of scientific evidence used in the development of the specific recommendation. In situations where no published literature exists, consensus of the panel members and outside expert reviewers was used to develop the guideline recommendation and the grade of recommendation is indicated as "Expert Consensus."

## METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

## DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The guideline development process adopted by the Spinal Cord Medicine Consortium consists of 12 steps, leading to panel consensus and organizational endorsement. After the steering committee chooses a topic, a panel of experts is selected. Panel members must have demonstrated leadership in the topic area through independent scientific investigation and publication. Following a detailed explication and specification of the topic by select steering committee and panel members, consultant methodologists review the international literature, prepare evidence tables that grade and rank the quality of research, and conduct statistical meta-analyses and other specialized studies, as needed. The panel chair then assigns specific sections of the topic to the panel members, based on area of expertise. Writing begins on each component using the references and other materials furnished by the methodology support group.

After the panel members complete their sections, a draft document is generated during the first full meeting of the panel. The panel incorporates new literature citations or other evidence-based information not previously available.

## RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Categories of the Strength of Evidence Associated with the Recommendation:

- A. The recommendation is supported by scientific evidence from properly designed and implemented controlled trials providing statistical results that consistently support the guidelines statement
- B. The recommendation is supported by scientific evidence from properly designed and implemented clinical series that support the guidelines statement
- C. The recommendation is supported by expert opinion

## COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

## METHOD OF GUIDELINE VALIDATION

External Peer Review  
Internal Peer Review

## DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

After legal analysis to consider antitrust, restraint-of-trade and health policy matters, the draft document is reviewed by clinical experts from each of the consortium organizations plus other select clinical experts and consumers. Sixty-nine expert reviewers are acknowledged in the guideline. The review comments are assembled, analyzed, and entered into a database, and the document is revised to reflect the reviewers' comments. Following a second legal review, the draft document is distributed to all consortium organization governing boards. Final technical details are negotiated among the panel chair, members of the organizations' boards, and expert panelists. If substantive changes are required, the draft receives a final legal review. The document is then ready for editing, formatting, and preparation for publication.

## RECOMMENDATIONS

### MAJOR RECOMMENDATIONS

An individual with a spinal cord injury at or above T6 presents with an acute onset of signs and symptoms of autonomic dysreflexia.

1. Recognize the signs and symptoms of autonomic dysreflexia, including:
  - Elevated blood pressure.
  - Pounding headache.
  - Bradycardia (may be a relative slowing so that the heart rate is still within the normal range).

- Profuse sweating above the level of the lesion, especially in the face, neck, and shoulders, or possibly below the level of the lesion.
- Piloerection or goose bumps above or possibly below the level of the lesion.
- Cardiac arrhythmias, atrial fibrillation, premature ventricular contractions, and atrioventricular conduction abnormalities.
- Flushing of the skin above the level of the lesion, especially in the face, neck, and shoulders, or possibly below the level of lesion.
- Blurred vision.
- Appearance of spots in the patient's visual fields.
- Nasal congestion.
- Feelings of apprehension or anxiety over an impending physical problem.
- Minimal or no symptoms, despite a significantly elevated blood pressure (silent autonomic dysreflexia).

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

An individual may have one or more of these signs and symptoms when experiencing an episode of autonomic dysreflexia. Symptoms may be minimal or even absent, despite an elevated blood pressure.

Health-care providers should be aware that the varying cognitive and verbal communication abilities of adults, children, and adolescents can cause the symptoms of autonomic dysreflexia to be absent, subtle, vague, or expressed imperfectly. Because of the varying cognitive and verbal communication abilities of individuals as they progress through infancy, childhood, and adolescence, symptoms of autonomic dysreflexia may not be expressed or may be communicated in a less articulate manner compared to a cognitively intact adult with spinal cord injury. For instance, preschool-aged children, even though they are verbal, may present with vague complaints; they are not able to accurately articulate that they are experiencing a pounding headache—a cardinal feature of autonomic dysreflexia.

2. Check the individual's blood pressure.
  - A sudden, significant increase in both the systolic and diastolic blood pressure above their usual levels, frequently associated with bradycardia. An individual with spinal cord injury above T6 often has a normal systolic blood pressure in the 90-110 mm Hg range. Therefore, a blood pressure of 20 mm to 40 mm Hg above baseline may be a sign of autonomic dysreflexia.
  - Systolic blood pressure elevations more than 15-20 mm Hg above baseline in adolescents with spinal cord injury or more than 15 mm Hg above baseline in children with spinal cord injury may be a sign of autonomic dysreflexia.

(Scientific evidence-III/V; Grade of recommendation-C; Strength of panel opinion-Strong)

Elevated blood pressures can be life-threatening and need immediate investigation and treatment. For children and adolescents, age and body size are determinants of normal blood pressures, with increasing blood pressures advancing with age and approximating adult norms in older teenagers. Similar to adults with spinal cord injury, children and adolescents with cervical and upper thoracic spinal cord injury would be expected to have lower baseline blood pressures compared to the general population. Therefore, it is important to determine and document baseline blood pressures on an annual basis or as needed, as the child or adolescent with spinal cord injury ages. For the purposes of these guidelines, the panel agreed that systolic blood pressures at or above 150 mm Hg in adults, 120 mm Hg in children under 5 years old, 130 mm Hg in children 6-12 years old, and 140 mm Hg in adolescents is when pharmacological agents should be considered.

Be calm and maintain a reassuring environment in the presence of the child's parents/caregiver when obtaining blood pressures. Any anxiety associated with obtaining blood pressures in children and adolescents may make it difficult to obtain accurate measurements both for baseline determinations as well as during an episode of autonomic dysreflexia. Teaching parents how to obtain blood pressures or having school nurses obtain baseline blood pressures may be beneficial. It is important that all health-care professionals remain calm and maintain a relaxing atmosphere.

Use appropriately sized blood pressure cuffs when measuring blood pressure in children and adolescents. The width of the blood pressure cuff should be approximately 40 percent of the arm circumference, measured midway between the olecranon and the acromion. The cuff bladder will cover 80 to 100 percent of the circumference of the arm. A blood pressure cuff that is too small may result in an overestimation of the individual's blood pressure. In contrast, a blood pressure cuff that is too large may result in an underestimation of the blood pressure, which is less than the error of overestimation with a cuff that is too small. If an appropriately sized blood pressure cuff is not available, interpretation of the blood pressure is complicated. However, it is important for the health-care professional or caregiver to remember that small blood pressure cuffs tend to overestimate and large cuffs tend to underestimate the true blood pressure.

3. If a pregnant woman with a spinal cord injury at T6 or above presents with signs and symptoms of autonomic dysreflexia, consider referral to an obstetric health-care provider under the following circumstances:
  - Determination of choice of antihypertensive medication.
  - Persistent hypertension after resolution of the acute autonomic dysreflexia episode.
  - Persistent symptoms of autonomic dysreflexia despite acute care measures.
  - Life-threatening autonomic dysreflexia.
  - Autonomic dysreflexia episode occurring in the third trimester of pregnancy.
  - Hypotension requiring pharmacological treatment.
  - First episode of autonomic dysreflexia during the pregnancy.
  - Presence of vaginal bleeding or suspicion of labor.

- Decisions to be made about long-term medication use.
- Unclear about the causes, signs, and symptoms, despite a normal blood pressure.

(Scientific evidence-None; Grade of recommendation- Expert consensus; Strength of panel opinion-Strong)

Care of pregnant women with autonomic dysreflexia should take into account that, due to compression of the vena cava, hypotension may occur if the woman is in supine position. A lateral tilt or upright position facilitates resolution of the hypotension and improves uterine flow.

4. If signs or symptoms of autonomic dysreflexia are present, but the blood pressure is not elevated and the cause has not been identified, refer the individual to an appropriate consultant depending on symptoms.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

Other medical problems may be causing the signs and symptoms of autonomic dysreflexia.

5. If the blood pressure is elevated, immediately sit the person up if the individual is supine.

(Scientific evidence-III/V; Grade of recommendation-C; Strength of panel opinion-Strong)

Performing this maneuver may allow a pooling of blood in the lower extremities and may reduce the blood pressure. If possible, in addition to sitting the person up, lower their legs as well.

6. Loosen any clothing or constrictive devices.

(Scientific evidence-III/V; Grade of recommendation-C; Strength of panel opinion-Strong)

Performing this maneuver may allow a pooling of blood in the abdomen and lower extremities and may reduce the blood pressure.

7. Monitor the blood pressure and pulse frequently.

(Scientific evidence-III/V; Grade of recommendation-C; Strength of panel opinion-Strong)

Blood pressures have the potential of fluctuating quickly during an autonomic dysreflexia episode. Therefore, pressures need to be monitored every few minutes (every 2 to 5 minutes is commonly cited), until the individual is stabilized. Individuals with spinal cord injury usually have impaired autonomic regulation, and therefore blood pressures can rapidly fluctuate.

8. Quickly survey the individual for the instigating causes, beginning with the urinary system.

(Scientific evidence-III/V; Grade of recommendation-C; Strength of panel opinion-Strong)

The most common cause of autonomic dysreflexia is bladder distension.

9. If an indwelling urinary catheter is not in place, catheterize the individual.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

The most common cause of autonomic dysreflexia is bladder distension.

10. Prior to inserting the catheter, instill 2 percent lidocaine jelly (if immediately available) into the urethra and wait 2 minutes, if possible.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

Catheterization can exacerbate autonomic dysreflexia. The use of lidocaine jelly may decrease the sensory input and relax the sphincter to facilitate catheterization. The peak effect of lidocaine jelly is between 2-5 minutes. Exercise clinical judgment regarding elevated blood pressure; immediate catheterization may be necessary.

11. If the individual has an indwelling urinary catheter, check the system along its entire length for kinks, folds, constrictions, or obstructions and for correct placement. If a problem is found, correct it immediately.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

12. If the catheter appears to be blocked, gently irrigate the bladder with a small amount (10-15 cc) of fluid, such as normal saline at body temperature. Irrigation should be limited to 5-10 ml for children under 2 years of age and to 10-15 ml in older children and adolescents. Avoid manually compressing or tapping on the bladder.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

Use of a larger volume or of a cold solution might irritate the bladder and exacerbate autonomic dysreflexia. If a lidocaine solution is readily available, irrigation with it may be beneficial by decreasing sensory input from the bladder. Bladder pressure or tapping may also increase sensory input and

exacerbate autonomic dysreflexia. Do not continue to irrigate the bladder if the fluid is not draining.

13. If the catheter is draining and the blood pressure remains elevated, proceed to recommendation 18.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion--Strong)

14. If the catheter is not draining and the blood pressure remains elevated, remove and replace the catheter.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion--Strong)

Irrigating and changing the catheter should be done as quickly as possible. Pharmacologic management may become necessary if the blood pressure remains elevated and/or if catheter placement is difficult. Refer to Recommendation 19 and its accompanying rationale for guidance on pharmacologic management.

15. Prior to replacing the catheter, instill 2 percent lidocaine jelly (if immediately available) into the urethra and wait 2 minutes, if possible.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

Catheterization can exacerbate autonomic dysreflexia. The use of lidocaine jelly may decrease the sensory input and relax the sphincter to facilitate catheterization. The peak effect of lidocaine jelly is between 2-5 minutes. Exercise clinical judgment regarding elevated blood pressure and the use of lidocaine; immediate catheterization may be necessary.

16. If difficulties arise in replacing the catheter, consider attempting to pass a coude catheter or consult a urologist.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

A coude catheter may be useful if there is an associated bladder neck obstruction.

17. Monitor the individual's blood pressure during bladder drainage.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

Sudden decompression of a large volume of urine would be expected to normalize blood pressure. However, this may cause hypotension if the

individual has already been given pharmacological agents to decrease the blood pressure. (See Recommendation 21.)

18. If acute symptoms of autonomic dysreflexia persist, including a sustained elevated blood pressure, suspect fecal impaction.

(Scientific evidence-II/V; Grade of recommendation-B/C; Strength of panel opinion-Strong)

Fecal impaction is the second most common cause of autonomic dysreflexia.

19. If the elevated blood pressure is at or above 150 mm Hg systolic, consider pharmacologic management to reduce the systolic blood pressure without causing hypotension prior to checking for fecal impaction.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion--Strong)

If the blood pressure remains elevated but is less than 150 mm Hg systolic, proceed to recommendation 22.

(Scientific evidence-V; Grade of recommendation-C; Strength of panel opinion-Strong)

Reviewer opinion varied on whether the next step should be investigating other causes (e.g., fecal impaction) or initiating pharmacologic management. The control of hypertension may need to be addressed prior to digital stimulation or other diagnostic maneuvers, which may exacerbate autonomic dysreflexia. This is true for nonpregnant adults, pregnant women, and children and adolescents, as well.

There are no studies showing the exact point at which blood pressure becomes dangerous. For this recommendation, the guideline panel decided to adopt 150 mm Hg systolic blood pressure as the value at which pharmacological treatment should be considered. An adult with an injury at or above T6 would be expected to have a baseline systolic blood pressure between 90 and 110 mm Hg.

Pharmacological management of autonomic dysreflexia in children and adolescents should be considered prior to checking for fecal impaction if the blood pressure is excessively elevated for the child's or adolescent's age and height. Knowing the child's baseline blood pressure is very important when deciding whether to intervene with antihypertensive medications. Indications for pharmacological intervention may include a systolic blood pressure of 120 mm Hg in infants and younger children (under 5 years old), 130 mm Hg in older children (6-12 years old), and 140 mm Hg in adolescents.

20. Use an antihypertensive agent with rapid onset and short duration while the causes are being investigated.

(Scientific evidence-V; Grade of recommendation-C; Strength of panel opinion-Strong)

Nifedipine and nitrates are the most commonly used agents. If nifedipine is used, it should be in the immediate-release form. Bite-and-swallow is the preferred method of administration. Sublingual nifedipine administration may lead to erratic absorption.

Nifedipine should be used with extreme caution in elderly people or in people with coronary artery disease. In individuals without spinal cord injury, immediate-release nifedipine has been reported to cause shunting of the blood away from the heart and reflex tachycardia, and to result in an uncontrollable fall in blood pressure.

A review of the literature from 1966 through December 2000 reveals that there have been no reported adverse effects from the use of nifedipine when used to treat autonomic dysreflexia. Nifedipine has been discussed in the literature as a prophylactic treatment for autonomic dysreflexia. Other drugs that have been used to treat autonomic dysreflexia with severe symptoms include hydralazine, mecamylamine, diazoxide, and phenoxybenzamine. In an appropriately monitored setting, the guideline panel supports the use of an intravenous drip of sodium nitroprusside for rapid titration of blood pressure. If 2 percent nitroglycerin ointment is used, 1 inch may be applied to the skin, above the level of spinal cord injury. There are no studies reporting on the best agent to use.

There is increasing use of sildenafil in those with spinal cord injury. The use of medications containing nitrates is contraindicated when a person has taken sildenafil. Medications containing nitrates are sometimes used for the treatment of acute autonomic dysreflexia. Prior to the use of nitrates, such as nitroglycerin, isosorbide dinitrate, or sodium nitroprusside, a person with spinal cord injury presenting with acute autonomic dysreflexia should be questioned regarding sildenafil. If this agent has been used within the last 24 hours it is recommended that an alternative short-acting, rapid-onset antihypertensive agent be used.

Examples of agents with such characteristics are prazosin and captopril. Both have an onset within thirty minutes, achieve peak serum levels within 1-3 hours, and have elimination rate half-lives of 2-4 hours.

## 21. Monitor the individual for symptomatic hypotension.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

Treat severe (symptomatic) hypotension by laying the individual down and elevating the legs. Additional corrective measures are not usually required. However, if indicated, consider intravenous fluids and adrenergic agonists (i.e., in a monitored setting, intravenous norepinephrine for reversal of severe hypotensive events).

22. If fecal impaction is suspected and the elevated blood pressure is less than 150 mm Hg, check the rectum for stool, using the following procedure:

- With a gloved hand, instill a topical anesthetic agent, such as 2 percent lidocaine jelly, generously into the rectum.
- Wait 2 minutes if possible for sensation in the area to decrease.
- Then, with a gloved hand, insert a lubricated finger into the rectum and check for the presence of stool. If present, gently remove, if possible.
- If autonomic dysreflexia becomes worse, stop the manual evacuation. Instill additional topical anesthetic and recheck the rectum for the presence of stool after approximately 20 minutes.

(Scientific evidence-II/V; Grade of recommendation-B/C; Strength of panel opinion-Strong)

A rectal examination may exacerbate autonomic dysreflexia. Instillation of a local anesthetic agent may decrease the occurrence of autonomic dysreflexia during the exam.

23. If the precipitating cause of the autonomic dysreflexia episode has not yet been determined, check for less frequent causes. The individual may need to be admitted to the hospital; see recommendation 25 for considerations.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion--Strong)

As the most common causes of autonomic dysreflexia are related to bladder and bowel problems, further assessment may need to include more advanced diagnostic procedures. For example, cystoscopies or urodynamic studies may detect urinary system pathology or dysfunction.

Other causes of autonomic dysreflexia need to be investigated appropriate treatment and to resolve the episode.

24. Following an episode of autonomic dysreflexia, instruct the individual to monitor symptoms and blood pressure for at least 2 hours after resolution of the episode to make sure that it does not reoccur.

- Educate the individual to seek immediate medical attention if it reoccurs.
- Monitor inpatients closely for at least 2 hours, as deemed necessary by the health-care provider.
- Seek the pregnant woman's obstetrical-care provider for evaluation.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

The hypertension and symptoms may have resolved because of the medication rather than the treatment of the cause. Symptoms managed by pharmacologic treatment may begin to reverse themselves within this time frame.

25. Consider admitting the individual to the hospital for monitoring to maintain pharmacologic control of the blood pressure, and to investigate other causes:
- If there is poor response to the treatment specified above.
  - If the cause has not been identified.
  - If there is suspicion of an obstetrical complication.

(Scientific evidence-V; Grade of recommendation-C; Strength of panel opinion-Strong)

Because of the loss of sensation, individuals with spinal cord injury can have significant pathology with minimal symptoms. These may include problems such as acute abdominal pathology, long bone fractures, and ingrown toenails. Individuals with spinal cord injury frequently may have a positive urine culture. However, this may not be the precipitating cause for autonomic dysreflexia, and therefore other causes of autonomic dysreflexia should be investigated.

26. Document the episode in the individual's medical record, including:
- Presenting signs and symptoms and their course.
  - Treatment instituted.
  - Recordings of blood pressure and pulse.
  - Response to treatment.

Evaluate the effectiveness of the treatment according to the level of outcome criteria reached:

- Cause of the episode has been identified.
- Blood pressure has been restored to normal limits for the individual (usually 90 to 110 systolic mm Hg for a tetraplegic individual in the sitting position).
- Pulse rate has been restored to normal limits.
- The individual is comfortable, with no signs or symptoms of autonomic dysreflexia, of increased intracranial pressure, or of heart failure.
- An education plan has been completed and included preventive and emergency management guidance.

(Scientific evidence-None; Grade of recommendation--Expert consensus; Strength of panel opinion-Strong)

27. Once the individual with spinal cord injury has been stabilized, review the precipitating cause of the autonomic dysreflexia episode with the individual, family members, significant others, and caregivers. This preventive process entails:

- Adjusting the treatment plan to ensure that future episodes are recognized and treated to prevent a medical crisis or, ideally, are avoided altogether.
- Discussing autonomic dysreflexia during the individual's education program, so that he or she will be able to minimize the risks known to precipitate AD, solve problems, recognize early onset, and obtain help as quickly as possible.
- Providing the individual with education about the prevention and treatment of autonomic dysreflexia at the time of discharge that can be referred to in an emergency.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

Health-care professionals should refer to the consumer guide *Autonomic Dysreflexia: What You Should Know* to provide individuals a tool to help guide their own treatment of autonomic dysreflexia. This consumer guide is written in such a way that both adults and children will find it helpful. Please refer to the "Companion Documents" field.

A written guide or alert, such as the wallet card found in the above referenced consumer guide, may help them in communicating with their health-care providers. Such an alert system is especially needed when individuals with concomitant injuries that have resulted in reduced or limited cognition and verbal skills may be hindered in their ability to communicate that they are experiencing autonomic dysreflexia.

A written treatment plan for autonomic dysreflexia prepared for children and adolescents with spinal cord injury should include:

- The child's normal blood pressure, which is updated annually or more frequently as needed.
- Diagnostic criteria.
- An emergency management plan

Limited cognition and verbal skills hinder the ability of younger children to communicate that they are experiencing autonomic dysreflexia with health-care providers, teachers, and other adults who are responsible for supervising their activities.

In addition to the signs and symptoms seen in adults, infants and children may present with nonspecific symptoms, such as crying, irritability, or somnolence. Parents of young children should consider using some form of medical alert identification as well as ensure that appropriate education is provided to those adults who have significant interactions with and responsibility for their child with spinal cord injuries, such as teachers, school nurses, coaches, and community-based health-care providers.

When a woman with spinal cord injury at T6 and above becomes pregnant, her care should be coordinated by an interdisciplinary team. It is recommended that the team develop a plan regarding management of autonomic dysreflexia.

28. Schedule detailed evaluations for individuals with recurrent autonomic dysreflexia.

(Scientific evidence-None; Grade of recommendation-Expert consensus; Strength of panel opinion-Strong)

There may be subtle changes in an individual's medical condition, such as a worsening of detrusor sphincter dyssynergia or an expanding syrinx that is causing recurrent autonomic dysreflexia. Therefore, a detailed medical evaluation is warranted.

Definitions:

Hierarchy of the Levels of Scientific Evidence:

- I. Large randomized trials with clear-cut results
- II. Small randomized trials with uncertain results
- III. Nonrandomized trials with concurrent or contemporaneous controls
- IV. Nonrandomized trials with historical controls
- V. Case series with no control

Categories of the Strength of Evidence Associated With the Recommendations:

- A. The guideline recommendation is supported by one or more level I studies
- B. The guideline recommendation is supported by one or more level II studies
- C. The guideline recommendation is supported only by level III, IV, or V studies

Strength of Panel Opinion:

Low: 1.0 to less than 2.33

Moderate: 2.33 to less than 3.67

Strong: 3.67 to 5.0

CLINICAL ALGORITHM(S)

None provided

## EVIDENCE SUPPORTING THE RECOMMENDATIONS

### TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The recommendations were based primarily on a comprehensive review of published reports. In situations where no published literature existed, consensus of the panel members and outside expert reviewers was used to develop the guideline recommendation and the grade of recommendation is indicated as "expert consensus".

The type of supporting evidence is identified for each recommendation (see "Major Recommendations").

## BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

### POTENTIAL BENEFITS

Appropriate management of autonomic dysreflexia, resulting in decreased mortality and morbidity from autonomic dysreflexia

Subgroups Most Likely to Benefit:

- Children and adolescents with spinal cord injuries, because of the developmental variations in blood pressure in this age group, appropriate sizing of blood pressure cuffs, the relative inability of children to communicate their symptoms, and the varying dependence of children and adolescents upon their parents or guardians
- Pregnant women, because failure to recognize and treat autonomic dysreflexia has caused intracranial hemorrhage and death in this population

### POTENTIAL HARMS

Urinary catheterization

Catheterization can exacerbate autonomic dysreflexia.

Rectal examination

A rectal examination may exacerbate autonomic dysreflexia.

Nifedipine

In individuals without spinal cord injury, immediate release nifedipine has been reported to cause shunting of the blood away from the heart and reflex tachycardia, and to result in an uncontrollable fall in blood pressure.

Subgroups Most Likely to be Harmed:

Nifedipine should be used with extreme caution in elderly people or in people with coronary artery disease.

## CONTRAINDICATIONS

### CONTRAINDICATIONS

The use of medications containing nitrates is contraindicated when a person has taken sildenafil.

## QUALIFYING STATEMENTS

### QUALIFYING STATEMENTS

This guideline has been prepared based on scientific and professional information known about the treatment of autonomic dysreflexia following spinal cord injury in 2000. Users of this guide should periodically review this material to ensure that the advice herein is consistent with current reasonable clinical practice.

Detailed literature reviews were undertaken in the areas of pediatrics and obstetrics as they related to autonomic dysreflexia. The literature regarding evaluation and management of autonomic dysreflexia was extremely limited in these areas. This was of particular concern with regards to making recommendations on the diagnosis and management of autonomic dysreflexia in pregnant women. During pregnancy there are a number of other causes and treatments, depending on the type of hypertension. Therefore, the consortium steering committee recommended that these guidelines be limited to "when to refer" a pregnant women exhibiting signs and symptoms of autonomic dysreflexia.

## IMPLEMENTATION OF THE GUIDELINE

### DESCRIPTION OF IMPLEMENTATION STRATEGY

Dissemination and utilization via consortium dissemination strategy of twelve (12) avenues of distribution.

## INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

### IOM CARE NEED

Living with Illness

### IOM DOMAIN

Effectiveness  
Patient-centeredness

## IDENTIFYING INFORMATION AND AVAILABILITY

### BIBLIOGRAPHIC SOURCE(S)

Paralyzed Veterans of America/Consortium for Spinal Cord Medicine. Acute management of autonomic dysreflexia: individuals with spinal cord injury presenting to health-care facilities. Washington (DC): Paralyzed Veterans of America (PVA); 2001 Jul. 29 p. [138 references]

### ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1997 Feb (updated 2001 Jul)

GUIDELINE DEVELOPER(S)

Consortium for Spinal Cord Medicine - Private Nonprofit Organization  
Paralyzed Veterans of America - Private Nonprofit Organization

GUIDELINE DEVELOPER COMMENT

Consortium Member Organizations include: American Academy of Orthopedic Surgeons, American Academy of Physical Medicine and Rehabilitation, American Association of Neurological Surgeons, American Association of Spinal Cord Injury Nurses, American Association of Spinal Cord Injury Psychologists and Social Workers, American College of Emergency Physicians, American Congress of Rehabilitation Medicine, American Occupational Therapy Association, American Paraplegia Society, American Physical Therapy Association, American Psychological Association, American Spinal Injury Association, Association of Academic Physiatrists, Association of Rehabilitation Nurses, Congress of Neurological Surgeons, Eastern Paralyzed Veterans Association, Insurance Rehabilitation Study Group, Paralyzed Veterans of America, U.S. Department of Veterans Affairs.

SOURCE(S) OF FUNDING

Paralyzed Veterans of America

GUIDELINE COMMITTEE

Autonomic Dysreflexia Guideline Development Panel

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Names of Panel Members: Todd Linsenmeyer, MD (Chair and Steering Committee Liaison); Emily Baker, MD; Diana Cardenas, MD; Thomas Mobley, PharmD; Inder Perakash, MD; Lawrence Vogel, MD); Cynthia Zejdlik, RN; Andrea K. Biddle, PhD, MPH (Methodologist-1st Edition); David Matchar, MD (Methodologist-2nd Edition)

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

ENDORSER(S)

American Academy of Physical Medicine and Rehabilitation - Medical Specialty Society  
American Association of Spinal Cord Injury Nurses - Professional Association

American Paraplegia Society - Disease Specific Society  
American Spinal Injury Association - Disease Specific Society  
Department of Veterans Affairs - Federal Government Agency [U.S.]

#### GUIDELINE STATUS

This is the current release of the guideline. This guideline updates a previously released version (Acute management of autonomic dysreflexia: adults with spinal cord injury presenting to health-care facilities. J Spinal Cord Med 1997 Jul; 20[3]: 284-308).

An update is not in progress at this time.

#### GUIDELINE AVAILABILITY

Electronic copies: May be downloaded from the [Paralyzed Veterans of America \(PVA\) Web site](#) for a nominal fee.

Print copies: Single copies available from the Consortium for Spinal Cord Medicine, Clinical Practice Guidelines, 801 18th Street, NW, Washington, DC 20006.

#### AVAILABILITY OF COMPANION DOCUMENTS

None available

#### PATIENT RESOURCES

The following is available:

- Autonomic dysreflexia: what you should know. Washington, DC: Consortium for Spinal Cord Medicine (CSCM), c1997.

Electronic copies: May be downloaded from the [Paralyzed Veterans of America \(PVA\) Web site](#) for a nominal fee.

Print copies: Single copies are available from the Consortium for Spinal Cord Medicine, Clinical Practice Guidelines, 801 18th Street, NW, Washington, DC 20006.

Please note: This patient information is intended to provide health professionals with information to share with their patients to help them better understand their health and their diagnosed disorders. By providing access to this patient information, it is not the intention of NGC to provide specific medical advice for particular patients. Rather we urge patients and their representatives to review this material and then to consult with a licensed health professional for evaluation of treatment options suitable for them as well as for diagnosis and answers to their personal medical questions. This patient information has been derived and prepared from a guideline for health care professionals included on NGC by the authors or publishers of that original guideline. The patient information is not reviewed by NGC to establish whether or not it accurately reflects the original guideline's content.

#### NGC STATUS

This summary was completed by ECRI on June 30, 1998. The information was verified by the guideline developer on December 1, 1998. This summary was updated by ECRI on December 11, 2001. The information was verified by the guideline developer on January 3, 2002.

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